

Northern Short-tailed Shrew

Blarina brevicauda

DESCRIPTION

The northern short-tailed shrew is an energetic small animal with dark slate-colored pelage. It is readily identified as a shrew by its pointed snout, minute eyes, concealed ears, and five toes on each foot. Similar to all other New World shrews, the northern short-tailed shrew has dark red-brown to dark chestnut coloration at the apex of the teeth (Whitaker and Hamilton 1998). As its name implies, the short tail, which is approximately 20 percent of total animal length, readily distinguishes this shrew from close relatives in the genus *Sorex*, whose tail lengths exceed 40 percent of total animal length (George *et al.* 1986).

BODY SIZE

The northern short-tailed shrew is a large stout shrew. Total length and weight of 60 males from Indiana ranged from 100 – 126 mm (mean 115) and 11.0 – 26.3 g (mean 17.5), respectively. Mean measurements of adults of both sexes from New York were 124 mm for total length (n=60) and 19.3 g for weight (n=50) (Whitaker and Hamilton 1998).

In The Primary Study Area: Total lengths, tail lengths, and weights of 58 adults of both sexes caught during small mammal trapping studies in 1998 – 2000 were 104 – 150 mm (mean = 123 mm), 21 – 34 mm (mean = 25 mm), and 15 – 33 g (mean = 22g), respectively. Total lengths, tail lengths, and weights of six juveniles were 102 – 122 mm (mean = 111 mm), 24 – 30 (mean = 23mm), and 11 – 15 g (mean = 14g), respectively.

DISTRIBUTION

The northern short-tailed shrew is primarily a species of northeastern and north-central United States and adjacent southern Canada (George *et al.* 1986). It is found from Cape Breton Island and southern Quebec, south to Maryland, continuing south to Georgia and Alabama in the Appalachian Mountains,

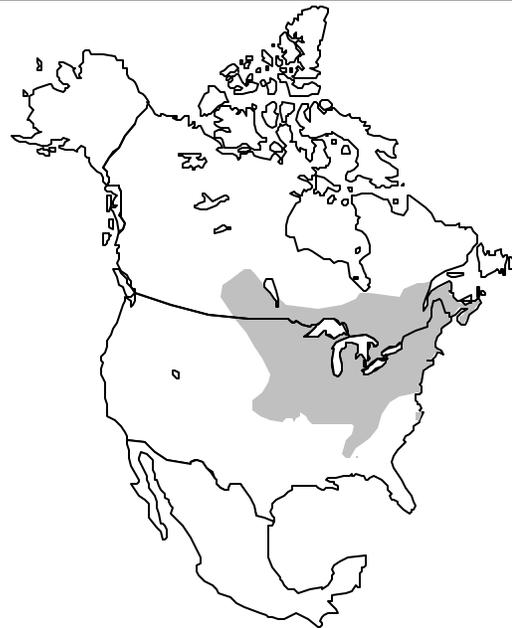


Figure 1. Range of northern short-tailed shrew in North America

west to Nebraska, and north to southeastern Saskatchewan (Figure 1). An isolated subspecies (*B. b. telmalestes*) is also found in a small region on the coastal plain of Virginia and North Carolina. The northern short-tailed shrew is replaced to the south by Elliot's short-tailed shrew (in the west) and southern short-tailed shrew (in the east). In Massachusetts, the northern short-tailed shrew is represented by subspecies *talpoides*, a race found mainly in New England and adjacent Quebec, south to New York, Pennsylvania, and New Jersey.

MIGRATION

Northern short-tailed shrews do not undergo seasonal migration, and remain in their home area year round.

HABITAT

The northern short-tailed shrew is a ubiquitous species that occupies a diversity of habitat types, including wetlands and uplands (Whitaker and Hamilton 1998). It is reported to occur in both forested and open habitats by Miller and Getz (1977). Wrigley *et al.* (1979) found that vegetation cover (e.g., herb, shrub, tree) did not appear to influence northern short-tailed shrew presence in Manitoba. In forested communities, northern short-tailed shrews are less common in conifer stands (DeGraaf *et al.* 1991, Miller and Getz 1977). This shrew is known to lose much water through dermal evaporation and therefore rarely occurs in xeric habitats (Whitaker and Hamilton 1998, Getz 1961). In New York and Michigan, northern short-tailed shrews were found in a variety of habitats, so long as there was enough moisture to maintain 100% humidity in its burrows (Whitaker and Hamilton 1998).

Northern short-tailed shrews are active on the surface, in leaf litter, and below ground. A well-developed leaf litter is thought to be important in protecting shrews from moisture and temperature extremes (Pruitt 1953, Pruitt 1959). Northern

short-tailed shrews can burrow in loose soil and push under rocks and other objects. Burrows are usually found in the upper 4 inches of soil, rarely as deep as 20 inches (Hamilton 1931, Jameson 1943). Use of echolocation to explore subterranean habitats has been documented in northern short-tailed shrews by Tomasi (1979).

In the Primary Study Area: Northern short-tailed shrews were found in a variety of natural communities within the 10-year floodplain of the Housatonic River in Pittsfield, Lenox, and Lee. Transitional floodplain forests, red maple swamps, black ash–red maple–tamarack calcareous seepage swamps, and high-terrace floodplain forests were communities utilized by this shrew. Data on habitat use by northern short-tailed shrews from the Housatonic River ecological characterization studies are presented in Table 1 below.

HIBERNATION

Northern short-tailed shrews are reported to be active day and night throughout the year (Whitaker and Hamilton 1998). Studies by Buckner (1964), Randolph (1973), Martin (1983) and Merritt (1986) demonstrate, however, a pronounced nocturnal

Table 1. Habitat use by the short-tailed shrew in the primary study area from 1998-2000 surveys

Habitat Codes and Natural Community Classifications																	
Wetland Habitats										Terrestrial Habitats							
ROW	ROW & PAB	SHO	PFO				PSS	PEM	WM	VP	SW	MW	HW		OF	AGR	RES
Medium-gradient stream																	
Low-gradient stream																	
Riverine pointbar and beach																	
Mud flat																	
Red maple swamp			Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
Black ash-red maple-tamarack calcareous seepage swamp			Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
Transitional floodplain forest			Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
High-terrace floodplain forest			Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
Shrub swamp																	
Deep emergent marsh																	
Shallow emergent marsh																	
Wet meadow																	
Woodland vernal pool																	
Spruce-fir-northern hardwood forest										Y							
Northern hardwoods-hemlock-white pine forest										Y							
Successional northern hardwood forest										Y							
Red oak-sugar maple transitional forest										Y							
Rich mesic forest										Y							
Cultural grassland										Y							
Agricultural cropland										Y							
Residential development										Y							

ROW = Riverine Open Water
 SHO = Shorelines
 PFO = Palustrine Forested
 PSS = Palustrine Scrub-Shrub
 PEM = Palustrine Emergent
 WM = Wet Meadow
 PAB = Palustrine Aquatic Bed

VP = Vernal Pool
 SW = Softwood Forests
 MW = Mixed Forests
 HW = Hardwood Forests
 OF = Open Fields
 AGR = Agricultural Croplands
 RES = Residential

Season of Use
 B = Breeding
 M = Migration
 W = Wintering
 Y = Year-round
 Shading = observed in study area

activity pattern. Although northern short-tailed shrews do not hibernate, they do show reduced activity during extended periods of cold temperatures (Merritt 1986).

HOME RANGE AND TERRITORIALITY

Although estimates of home range for northern short-tailed are frequently reported as 6 acres, as noted by DeGraaf and Yamasaki (2001), Whitaker and Hamilton (1998) state that this number is too large. They instead found that an area of 0.06 acres was used by this species in central New York.

Northern short-tailed shrews are thought to have overlapping territories (i.e., they do not defend territories) (Blair 1940). Many authors considered this shrew to be solitary and unfriendly to members of the same species (Jackson 1961, Martin 1981a, Shull 1907). Rood (1958) instead found the sociability of northern short-tailed shrews to depend on individual characteristics, with age and sex playing a lesser role.

BREEDING

Northern short-tailed shrews breed from March to September (DeGraaf and Yamasaki 2001, Whitaker and Hamilton 1998). As many as four litters may be produced, though two peak breeding times occur, one in spring and one in late summer and early fall (Blair 1940, Whitaker and Hamilton 1998). The gestation period ranges from 17 to 22 days (DeGraaf and Yamasaki 2001, Hamilton 1929, Pearson 1944). Litter size ranges from three to seven, with a maximum of nine and an average of 4.5 (DeGraaf and Yamasaki 2001, Pearson 1944, Whitaker and Hamilton 1998).

Multiple matings are required for ovulation in female northern short-tailed shrews. At least 6 matings per day are needed to induce ovulation, which occurs from 55 to 71 hours after the first copulation (Pearson 1944). As many as 20 matings in one day have been observed. Copulation lasts an average of five minutes. Shrews become locked together and the male is dragged about by the female until separation occurs. No post-copulatory plug is formed in the vagina as it is in some cricetid rodents.

GROWTH AND DEVELOPMENT

Neonates are approximately the size of honeybees. They are born essentially naked of fur, with dark pink skin and closed eyes and ears. Mean external measurements at two days of age were: total length 31 mm; length of tail 4 mm; weight 1.3 g. Young northern short-tailed shrews are reported to grow quickly and reach half of adult size in one month (Whitaker and Hamilton 1998). Those produced from spring litters mature more rapidly than those produced from late summer litters (Pearson 1944).

Pearson (1944) noted receptivity in a female at 50 days of age and the earliest successful breeding by a male was at 83 days. Northern short-tailed shrews, therefore, are capable of breeding in the same year they are born. Though this phenomenon has been observed by Blus (1971), Dapson (1968), and Pearson (1944), most are thought not to breed in the same season they are born (Whitaker and Hamilton 1998).

FOOD HABITS AND DIET

Earthworms are reported to be the most important food item for northern short-tailed shrews (Mumford and Whitaker 1982, Whitaker and Ferraro 1963, Whitaker and Hamilton 1998). Millipedes, slugs, snails, and insect larvae are also important prey items (Linzey and Linzey 1973, Whitaker and Hamilton 1998). Arachnids, mollusks, other small vertebrates, and plant materials are additional reported food items (Hamilton 1941). Plant materials include roots, nuts, and berries. Northern short-tailed shrews are thought to consume the fungus *Endogone*, as do many other small mammals (Whitaker and Hamilton 1998).

Northern short-tailed shrews do utilize limited food storage (Whitaker and Hamilton 1998). This is practiced primarily during the winter season to conserve energy and limit foraging time. Piles of snails have been observed in and around shrew burrows (Whitaker and Hamilton 1998). Their role as predators of mice and voles has been debated. Merriam (1884) asserted that northern short-tailed shrews were not heavy predators of cricetids. Allen (1938) and Platt and Blakely (1973) thought that small mammals become important prey items when insects were unavailable. Eadie (1944, 1948)

found that although insects represent the majority of the northern short-tailed shrew diet, the frequency of meadow vole (*Microtus pennsylvanicus*) remains in shrew feces was positively correlated with meadow vole population cycles.

Short-tailed shrews (genus *Blarina*) and the European water shrew are the only mammals known to produce toxic saliva (Whitaker and Hamilton 1998). The poison is produced by the salivary glands and is secreted from a duct at the base of the lower incisors. It flows along a groove between the two incisors and, therefore, can be introduced into wounds made by their bite. The toxin can cause death in small mammals (Ellis and Krayner 1955, Pearson 1942). Death occurs from respiratory failure produced by severe dilation of peripheral vascular tissue. One function of the venom may be to stun or paralyze prey, as has been observed in insects. This may allow northern short-tailed shrews to utilize prey at a later date through food caching (Martin 1981b, Tomasi 1978).

POPULATIONS AND DEMOGRAPHY

Survivorship: Pearson (1945) found that 72.6 percent of young survived from birth to weaning. In mark and release experiments, six percent of the originally marked population was recaptured the subsequent season. Blus (1971) studied a captive colony and found that 11.1 percent of individuals lived for two years or more. Mean minimum life span for males and females is 4.6 months and 4.4 months, respectively.

Age at Maturity and Life Span: Northern short-tailed shrews reach breeding maturity in 50 – 83 days (see Growth and Development). Pearson (1945) reported that a wild-captured male and female northern short-tailed shrew lived to 33 months and at least 30 months of age, respectively. Examination of tooth wear from wild individuals, however, reveals that maximum age is likely 18 months.

Mortality: Factors contributing to northern short-tailed shrew mortality include predation and parasitism. Due to their small size, they are preyed on by a large number of mammalian and avian predators. One-hundred and forty-four

parasites are listed to occur on or in northern short-tailed shrews. This represents 32 species of ectoparasites and three orders of endoparasites (George *et al.* 1986).

Enemies: Northern short-tailed shrews have few defenses against larger predators. Their odor, however, produced from pair of glands along the flanks, is noted to cause some potential predators to discard the shrews (Whitaker and Hamilton 1998). Many species of diurnal and nocturnal raptors prey on northern short-tailed shrews. These include northern saw-whet owl, long-eared owl, short-eared owl, great horned owl, northern screech owl, barred owl, rough-legged hawk, northern harrier, and American kestrel (Choate 1972, Dexter 1978, Getz 1961, Kirkpatrick and Conway 1947, Mumford and Whitaker 1982, Williams 1936). Shrikes are also reported to prey on northern short-tailed shrews (Jackson 1961).

Mammals are also important predators of northern short-tailed shrews. House cats are considered to be the most important enemy in some areas (Whitaker and Hamilton 1998). Other mammalian predators include bobcat, feral dog, coyote, red fox, gray fox, least weasel, short-tailed weasel, long-tailed weasel, mink, striped skunk, raccoon, and Virginia opossum (Andrews and Boggess 1978, Blumenthal and Kirkland 1976, Errington 1936, Fowle and Edwards 1955, Hamilton 1928, Hamilton 1936, Hamilton 1959, Mumford and Whitaker 1982, Story *et al.* 1982). Fish and snakes are also reported to be predators (Whitaker and Hamilton 1998). Rattlesnakes, northern copperheads, brown snakes, and pine snakes are serpents known to feed on northern short-tailed shrews (Jackson 1961). Shrews have been found in the stomachs of Lake trout and green sunfish (Fowle and Edwards 1955, Huish and Hoffmeister 1947).

Intestinal roundworms, flukes, and tapeworms are some of the species of endoparasites that use northern short-tailed shrews as hosts (Whitaker and Hamilton 1998). A subcutaneous nematode was found to be common on shrews in Indiana. Thirty-two total species of ectoparasites were found on northern short-tailed shrews in that study (Whitaker and Hamilton 1998).

STATUS

General: Northern short-tailed shrews have broad habitat requirements and, therefore, are found in a wide variety of natural communities (Miller and Getz 1977). Because they can occur in many mesic and hydric communities, they are common and routinely collected during trapping efforts throughout New England.

In The Primary Study Area: Northern short-tailed shrews were found to be ubiquitous in many shrub and forested communities in the primary study area. Although they were not as common as white-footed mice, they were always encountered during trapping efforts. Furthermore, they were the most commonly observed shrew in the primary study area, occurring much more often than masked (*Sorex cinereus*), smokey (*S. fumeus*) and northern water (*S. palustris*) shrews. They were observed from the confluence downstream to the large backwater areas north of Woods Pond (Figure 2).

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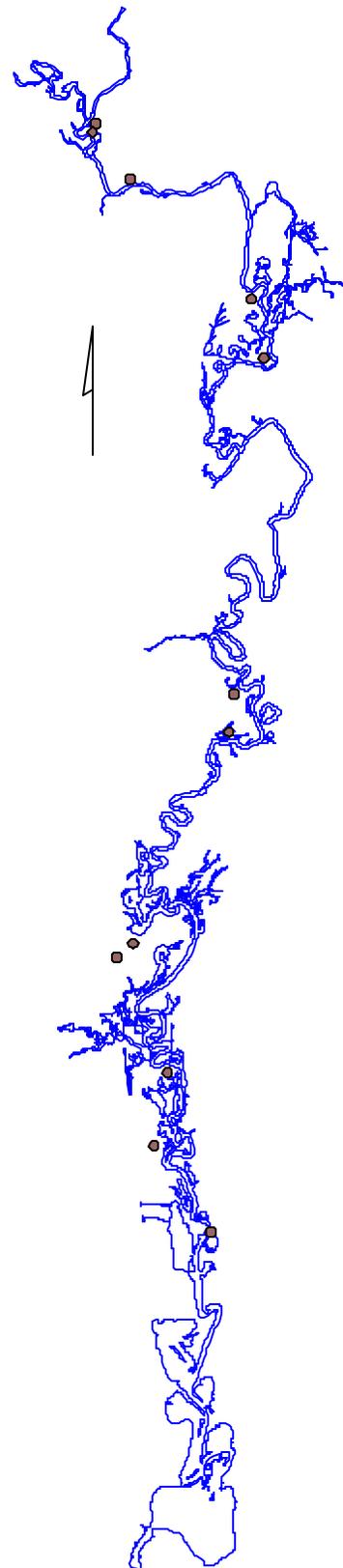


Figure 2. Northern short-tailed shrew sightings in the primary study area

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